Identifying the Causes and Protective Measures of Road Traffic Accidents (RTAs) in Bahawalpur City, Pakistan

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Road Traffic Accident (RTA) is a growing public issue and fall among the four top causes of mortality and morbidity globally. The main objective of this study was to identify the causes and protective measures of road traffic accidents in Bahawalpur City. Primary data was gathered through a structured questionnaire during a field survey in selected five public places as sample sites i.e. Larry Ada, University Chowk, Bahawal Victoria Hospital (BVH), One Unit Chowk, and Melad Chowk. Secondary data of road accidents was gathered form National Highway and Motor Way Police (NH&MP) while primary data was gathered from 150 respondents (30 from each study site) and analyzed in SPSS software by applying descriptive statistics and road accident risk index (RARI). Findings revealed that the main causes of these accidents include increase in population (62.66%), increase in demand for vehicles (22%), bike drivers (69.33%), overtaking of the vehicles (51.33%), over speed and hustle to reach the destination (34.66%). One wheeling is also a major reason, which results in the death of teenage drivers (52%), violation of the traffic rules (25.33%). RARI results also suggest the relationship between the affected persons and the road traffic accidents. Few suggestions were proposed to overcome the ratio and severity of road traffic accidents because these accidents are predictable and largely preventable through multi-disciplinary coherent strategies.

Keywords: Road Traffic Accidents, Causes, Protection, Bahawalpur, Pakistan.

INTRODUCTION

A road traffic accident is an unfortunate event that normally occur due to carelessness. Ignorance to traffic laws cause collisions between vehicles, pedestrians or any roadside signage and billboards which result causalities. About 30% to 70% of victims have been reported lying on beds in hospitals of developing [1]. Road accidents have become a significant issue concerning the social and economic problems causing disability, deaths and a massive health problems [2,3]. Various studies have revealed that increased costs of living have been observed for disabled persons that usually cost heavily to the poor people [2,3,4]. Road traffic accidents (RTAs) represent a leading and increasing

contributor to regional and global disease burden which have become the 3rd largest contributor to global disease burden by 2020 [5]. Each year nearly 1.3 million people die as a result of road traffic collisions globally, among them more than 3,500 deaths are report everyday on average. Moreover, 20 to 25 million people sustain non-fatal injuries from a collision, and these injuries are an important cause of disability worldwide. Moreover, RTAs are one of the contemporary leading human security threats because it is the global socio-economic crisis [6,7]. Low and middle income countries have suffered from a significant percentage of preventable deaths and injuries from road collisions and under the descriptive analysis, the annual average number of fatal and non-fatal accidents are 43.3% and 56.7% respectively [8,9].

Pakistan is a country having a very dense population and during the previous years, the use of vehicles have been increased exponentially [10,11] that increasd number of vehicles, hence the probability of accidents. A large number of road accidents have been reported in Pakistan, resulting in fatal causalities, deaths and disabilities. Road accidents remain a challenge for policy makers to address the present issue [12]. World Health Organization (WHO) reported more than 25000 road traffic fatalities in Pakistan annually on average. Likewise, WHO estimated the mortality rate per 100 thousand populations in Pakistan that is 14.2 [13]. The economic cost of road crashes and injuries is estimated to be over 100 billion rupees for Pakistan which is estimated to be 2% of Pakistan's GDP [14]. The huge number of injuries and deaths due to road traffic accidents revealed the story crisis of public health and road safety issues.

The main objective of this research is to identify the main causes and possible preventive measures in Bahawalpur City.

MATERIAL AND METHODS

Study Area.

Bahawalpur is a city located in the Punjab province of Pakistan. It is the 11th largest city in Pakistan with an estimated population of 798,509 [15]. It lies between the latitude of 27°-80′ to 29°-50′ north latitudes and between 70°-54′ to 72°-50′ east longitudes. Bahawalpur city is bordered by Yazman tehsil (a sub-administrative unit) to its south and southeast, Bahawalpur Sadder tehsil to its northeast, Lodhran to its north, and Ahmedpur East tehsil to its west.

Data Collection, Sampling and Sample Sites.

In order to collect data about the RTAs, a field survey was conducted in the Bahawalpur city during the months of August September 2019. Primary data was gathered through a structured questionnaire in selected five public places as sample sites i.e. Larry Adda (General Bus Stand), University Chowk, Bahawal Victoria Hospital (BVH) Chowk, One Unit Chowk, and Melad Chowk (Figure 1). Primary data was gathered from 150 respondents (30 from each study site) randomly by filling the questionnaires. The purposive sampling method was used to collect the data and respondents were briefly explained the purpose of the study. The majority of the respondents were male. Different variables including total accidents, fatal and nonfatal accidents, persons killed and injured and a total number of vehicles involved in accidents have been tested statistically. All of these public places have a bunch of people who have been engulfed in the daily road traffic accidents in Bahawalpur City.

Larry Adda is a place which has many congestions of intercity and intracity transport. University Chowk is a center point of the intercity transport. It is situated with the Islamia University old campus gate on the right and Government Sadiq Egerton College on the left. The famous and historical medical center Bahawal Victoria Hospital (BVH), Bahawalpur is also a busy route of daily traffic and also a dangerous point for an accident where traffic signal is also placed. One Unit Chowk is another area where questionnaires were got filled by the people and traffic signals are placed on this road. Melad Chowk is the next busy traffic junction where traffic signals are placed and questionnaires were filled by the people by the customers of nearby commercial plazas and visitors of Gulzar-e-Sadiq park situated on this Chowk.
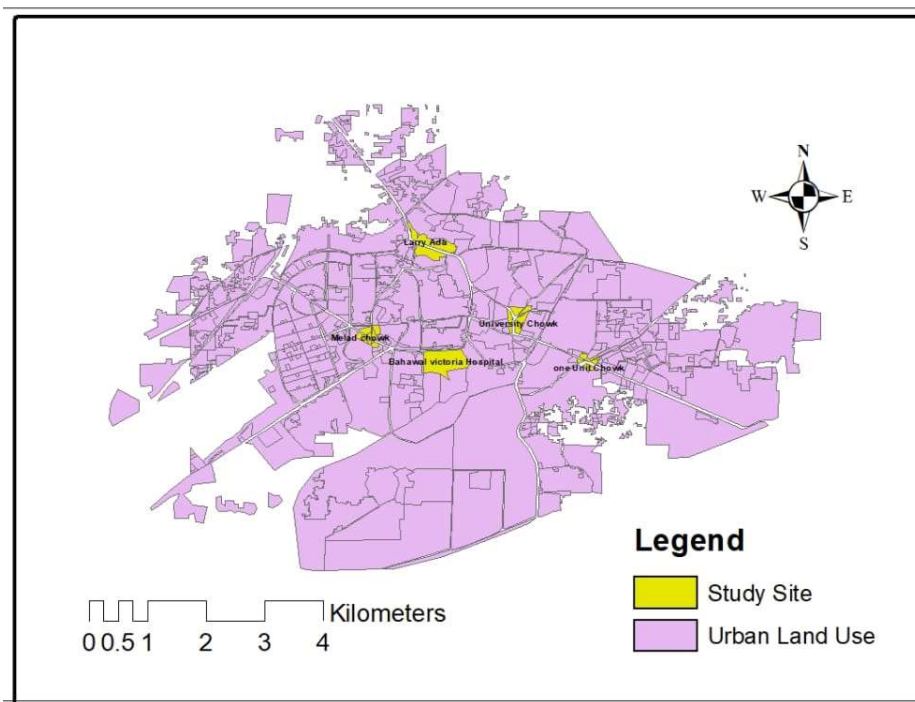

Figure 1: Study area map of Bahawalpur city showing study sites.

Data analysis.

The analysis of the data was carried out by applying descriptive statistics (frequency and percentages) in SPSS 17 software and applied the Road Accident Risk Index (RARI). The obtained data was processed, rearranged, tabulated and presented in tables and graphs to depict the results. Map of RTAs of study sites were prepared in ArcGIS 10.3 software.

Road Accident Risk Index (RARI).

Road safety risk index was applied to the present study and data was gathered from National Highway and Motorway Police (NH&MP). In order to calculate the risk linked with the safety of the roads, a comprehensive index was used to investigate the certain entities of the road safety. The relationship was used to assess the safety of the road [16,17] as shown in the equation (1):

$$Road\ Accident\ Risk\ Index = \frac{Road\ Safety\ Outcome}{Exposure}$$

Following measures were accounted before further proceeding,

      (i) the number of the people traveled in kilometers,

      (ii) population and number of the registered vehicles.

RARI was calculated by using the minimum number of input vehicles in the study area. Variables for the output were segregated as the number of the accidents (NOA) and number of affected people (NOAP). This risk index was applied to examine the unique value of RTAs risk.

RESULTS

Enforcement of road safety and traffic laws are not deterring the nasty situation on roads in Pakistan. The research for the reduction of RTAs has not been widely executed , than other health issues and is considered as a private or transport sector job, rather than public health issue therefore, the roads in Pakistan are among the dangerous roads in the world [18]. The findings of the study are briefly discussed as below:

Causes of Traffic Increase.

Upon enquiring the reasons of increase in traffic, 5.33% of respondents told that fuel prices were decreased during 2018 which resultantly increased the purchasing power of people and vehicles on the roads were increased due to the low price of fuel. Whereas 10% respondents told that the main factor behind this increase was the reduced prices of vehicles. The greater percentage of about 62.66% responded that traffic has been increased mainly due to increase in population of the country.
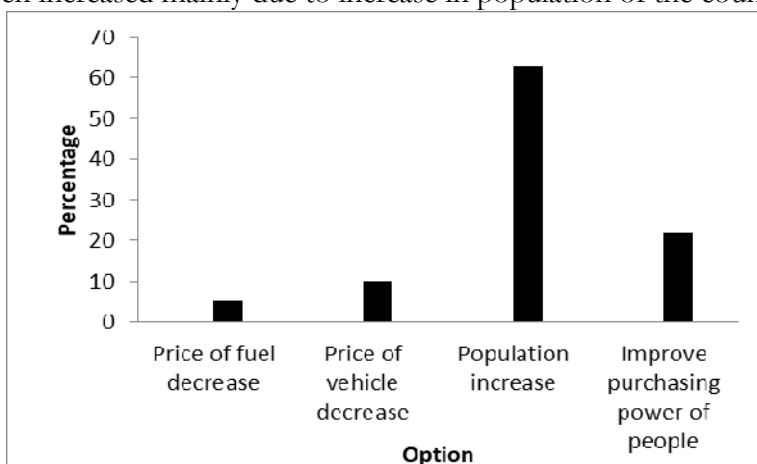

Figure 2: Cause of traffic increase.

Type of Vehicle caused RTA.

About 69.33% of respondents told that bike drivers are the key reason of accidents. Only 2.66% of respondents choose car as a cause of accident because it is four wheeler which can be controlled more easily than any other vehicle. Due to introduction of brands of buses, accidents caused by buses in one way or the other have been reduced drastically as the management does not allow their drivers to over speed the bus, 19.33% respondents replied that rickshaws are also one of the main reason of road accidents, as the drivers are usually illiterate people who do not have sound knowledge of traffic rules.
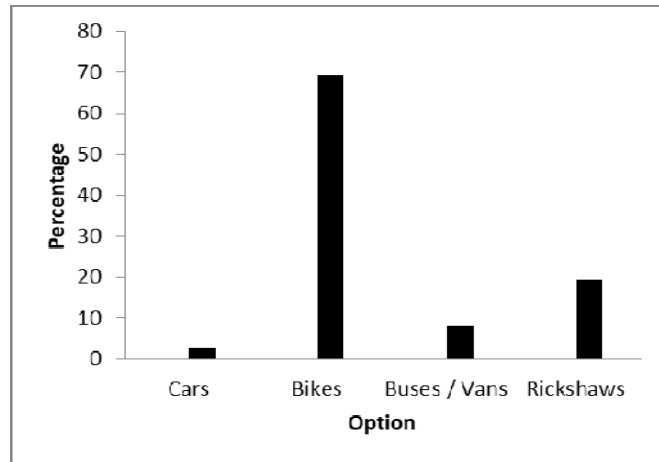
Figure 3: Type of vehicle cause RTAs.

Causes of Accidents in an Urban Area.

About 6% of the respondents replied that bad road conditions, mainly poorly maintained by the management resulting in fatal injuries while 8% of respondents were of view that violation of traffic rules became the leading reason of accidents in urban area. Overtaking cannot be ignored when we discuss about the causes of accidents in urban areas and about 51.33% respondents said that overtaking is the main reason of RTAs because people don't know how and when to overtake. Because of increased vehicles and limited road infrastructure, every person make hustle to reach at destination as responded by 34.66% respondents.
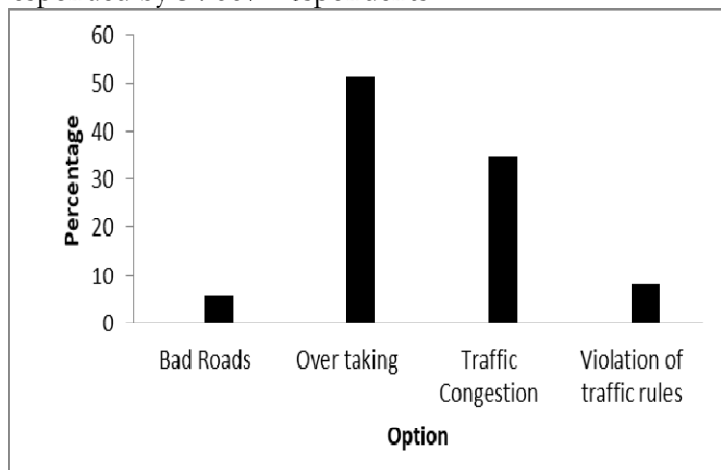

Figure 4: Causes of accidents in an urban area.

Major Cause of Death among Teen Drivers.

About 52% of respondents said that one wheeling is the major reason which results in death of teenagers. While 25.33% respondents replied that violation of traffic rules particularly signals and speed indicators were not followed because of illiterate drivers. Rash driving also hurdles the flow of smooth traffic within the city and 12% of respondents were agreed with this factor. About 10.66% respondents replied that usage of drugs is also one of the main reasons of death when a person drives the vehicle, after using drug that may result in senselessness or unconsciousness due to the medicinal effect which might results in serious nature of accidents.
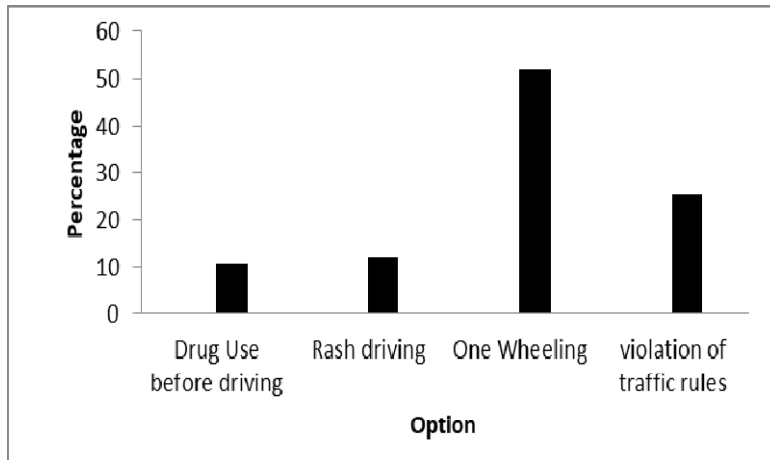
Figure 5: Top cause of death among teen drivers.

Preventing Bike Accident.

Out of total, 12.66% respondents replied that the accidents can be avoided using proper indicators. While glancing from side to side, mirrors play an important role where 11.33% respondents told that use of mirrors are also effective to control the percentage of accidents. Head, brain i.e. the skull part is the most exposed area while riding a bike which can be covered up for safety reasons by using helmet as replied by 20% of respondents. Keeping the speed limit normal, fatal injuries can be reduced as 56% of respondents chosen this option.
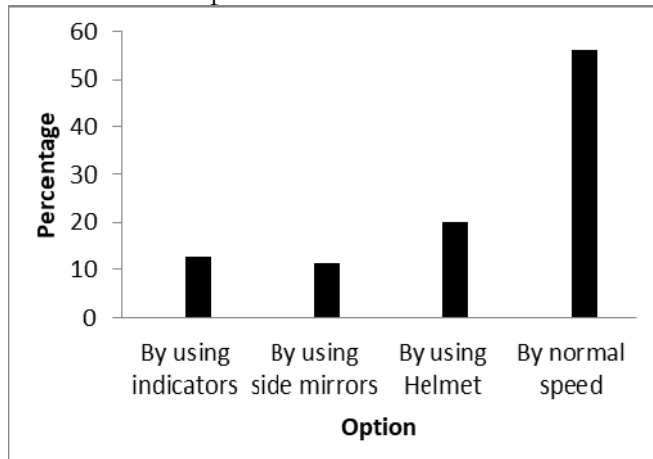

Figure 6: Preventing Bike accident.

Preventive Measures of RTAs.

About 13.33% respondents favored in careful driving to prevent the accident. Use of side mirrors are helpful while crossing the vehicles, that allow the driver to take a full view of their surroundings before making a move and same has been witnessed by 24.66% of respondents. Road sense is most important factor which cannot be neglected in discussing the preventive measures to avoid accidents as 40% respondents were in favor of same option. Often, violation of traffic signals and not stopping at yellow signals results in accident.
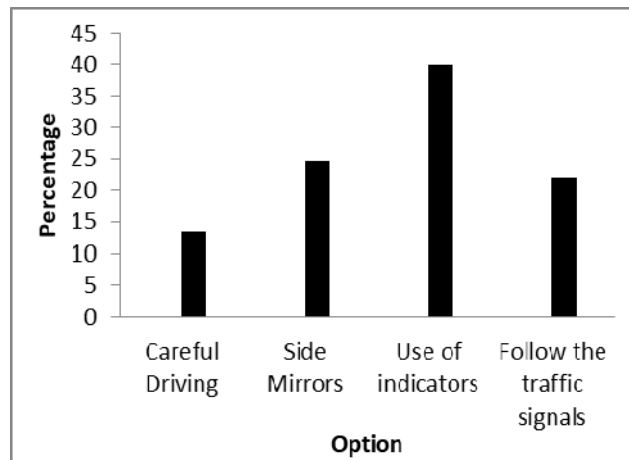
Figure 7: Prevention from RTAs.

DISCUSSION

It is evidence that the economic conditions of Pakistan were much better in 2017 and 2018 where purchasing power of people was increased, which maximized the demand of vehicles as responded by 22% of respondents. Meanwhile, speeding during a night condition also results into fatal traffic accidents. Careless human behavior contributed about 95% to road accidents. Similarly, in regard to the above data compilation more emphasis should be placed on human factors related to driving behavior [20]. The common causes of road accidents are bad eyesight, long reaction time, over-speeding, overtaking, neglecting of vehicle maintenance, incorrect application of driving aids, driver's mental and physical fitness, use of alcohol, use of drugs, fatigue, lack of education, training, age, religious influence, vehicle ownership, and use of charms as protection by drivers [21]. In a survey-based analysis held in Islamabad, the capital of Pakistan, the data taken from the hospital showed that 87% RTA cases occur due to the negligence of traffic laws [22]. Moreover, Availability of low cost vehicle, bike is usually used for travelling purpose, generally within the city. Therefore, the numbers of bikes have increased exponentially which augmented the road traffic. In Pakistan, the pedestrians and the rider of motorized (2 or 3 wheelers) are at a greater risk and the leading cause of RTAs fatalities are 41% and 39% respectively [23]. Poorly constructed road curves and relevant infrastructures would result in an extremely high accident rate and severe accident severities on curves [24]. Vehicle and equipment designs are also very important as a strategy for reduction of the burden of RTAs. Therefore, the design of locally manufactured vehicles needs to be improved in order to make them safer on the roads [25]. A study conducted in Karachi (2007-2014) showed that the highest number of fatalities were borne by riders of two-wheelers (cyclists and motorcyclists) which is 37.2% followed by pedestrians (35.80%) showing extreme pedestrians' vulnerability to RTAs in urban environment [29]. Additionally, the traffic law enforcement has shown poor performance and there is non-compliance to seat belt usage and helmet wearing in Pakistan [25,30].

RTAs are growing public issue and fall among four top causes of mortality and morbidity of different age groups. Flow of traffic nowadays has been increased therefore drivers should remain more careful about the uncertain happening. Therefore, the RTAs are predictable and largely preventable through multi-disciplinary coherent preventive strategies [31].

Results of the Road Accident Risk Index (RARI).

The Road Accident Risk Index (RARI) was applied where the data of 88 cases of road traffic accidents were analyzed. Table 1 depicts the volume/ capacity (V/C) of vehicles and vehicles hours of travelled (VHT) as input variables and number of accidents (NOA) and Number of affected persons (NOAP) as output variables and tested for correlation analysis. In order to establish the statistical relationship between the factors of the traffic flow and severity of the road accidents and vehicles, and was designated as safety output. The results suggest that after applying model for calculating risk in accident data analysis and management field, the lowest level must be measured as the measure of road safety. Therefore, this model has been applied to analyze the concept for road safety analysis too.

Table 1. Description of the road accidents data index analysis.

Stage	Variables	Description	N	Mean	SD	Min	Q1
Med.	**Q3**	**Max**					
Output	NOA	No. of accidents	88	-	-	1	1	1
2	12						
	NOAP	No of affected persons	88	-	-	1	3	4
6	158	Killed or injured					
Input	V/C	Volume / capacity	88	0.40	0.006	0.001	00.40
0.52	0.58	0.56					
	VHT	Vehicles Hours Travelled	88	7280	3536	3234	3635
3237	3638	3739					

Note: N is the number of the road accidents

SD: Standard Deviation Q1 and Q3 quartiles of the data, NOA Number of accidents, NOAP number of affected, injured or killed persons

CONCLUSION

Road traffic accident (RTA) is a critical public health problem and is a growing public issue and fall among four top causes of mortality and morbidity of different age groups. The findings of the study revealed that the increase in population boost the demand of vehicles which also increased the road traffic accidents especially the bike accidents, followed by the rickshaws. Therefore, based on the findings, it is summarized and recommended that awareness should be provided to the common masses towards the improvement in road safety. For this purpose, City Metropolitan Corporation can make a long term policy for the infrastructure of the roads conditions, repairing and timely maintenance of roads in the city with special focus on the most busy and excessively used roads.

Author's Contribution. Muhammad Atif Nazeer: Carried out the field survey and data collection, M Mohsin: supervised the research and did preliminary review. Abdul Rehman: Performed in data analysis and write-up of the manuscript.

Project details. This research is part of the BS Geography research project carried out by the first author and supervised the second author.

Conflict of interest. Authors declares no conflict of interest for publishing this manuscript in IJIST.

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